

Updating the Model to Compute the 2011 and Future ACS Margins of Error for Zero-Estimate Counts

The U.S. Census Bureau publishes the 90 percent margin of error (MOE) for the majority of ACS estimates using a successive difference replication methodology. However, there is at least one case where this methodology does not apply. A different technique is used when an estimate's value is zero ("zero-estimates"). The variance is modeled as a function directly proportional to the average weight for a state or nation, that is, $\text{Var} \sim k * \text{AW}$. In other words, the variance approximately equals the constant (k) multiplied by the average weight (AW). The 90 percent MOE is then 1.645 times the square root of the modeled variance.

The average weight for each state and the nation is updated every year, but the value of the "k" constant has remained the same over the last decade. The original k value of 400 was calculated in 2001 when the Census 2000 Supplemental Survey (the predecessor to the ACS) zero-estimate counts could be compared to the corresponding Census 2000 counts. With the completion of the 2010 Census, ACS zero-estimate counts could once again be compared with decennial Census data. An updated k value of 223 was computed and is being used to calculate the MOE for zero-estimate counts starting with the 2011 ACS data release.

The new value for k was calculated using a multistep process. First, ACS zero-estimates which had corresponding non-zero 2010 Census counts were identified. For each ACS zero-estimate, the 90 percent MOE was set equal to its corresponding 2010 Census count. Knowing the average weight, the MOE (2010 Census count) and using the factor of 1.645, the equation was solved for a unique k constant for each ACS zero-estimate. The individual values varied in size and were arranged in ascending order. The unique k value which was larger than 90 percent of the other individual k values was selected as the final k value.

Theory dictates that for a 90 percent confidence interval, nine out of ten times the true value will be included in the confidence interval calculated in this way (here taken to be the decennial Census count). Thus, for all confidence intervals, ten percent of the decennial Census counts should be outside of their corresponding confidence interval. To accomplish this, the unique k value which is larger than 90 percent of all of the other unique k constants is selected as the final value. This ensures that the zero-estimate plus the MOE yields a 90 percent confidence interval (relative to the 2010 Census).

For more information regarding the successive difference replication methodology and the model-based estimation technique used by ACS for calculating the zero-estimate MOE, visit Chapter 12 of the Design and Methodology Report at http://www.census.gov/acs/www/methodology/methodology_main/.